SECRETIN ENHANCED MRCP

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Relevant Disclosures

• Grant support:
  – National Pancreas Foundation

• In-kind grant support:
  – ChiRhoClin, Inc.
Objectives

- Review basics of secretin and its role in diagnosis of pediatric pancreatic disease
- Describe techniques for performing and interpreting secretin-enhanced MRCP
Pediatric Pancreatic Disease

- Endocrine insufficiency
- Exocrine insufficiency
- Pancreatitis
Pediatric Pancreatic Disease

• Endocrine insufficiency
• Exocrine insufficiency
• Pancreatitis
Pediatric Pancreatic Disease

- Multiple hereditary causes of exocrine insufficiency
- Increasing recognition of acute recurrent (ARP) and chronic pancreatitis (CP) as causes of exocrine insufficiency
  - 1-5 per 100,000
- Increasing recognition of genetic causes of ARP and CP
Secretin

- Secretin plays a role in assessment of pediatric pancreatic disease
  - Increase duct visibility
  - Duct stress test
  - Assess exocrine function
  - Perfusion effect?

Secretin Basics

• In broad terms: Adds value only* for pancreatic imaging
• Synthetic human secretin
  – 0.2 µg / kg, max 16 µg
  – Test dose (atopy, asthma)
  – Slow injection over 1 minute (abdominal pain, vomiting)
  – Contraindications – acute pancreatitis, allergy
• Mechanisms:
  – Bicarbonate secretion
  – Transient increase in tone at the sphincter of Oddi
• Plasma half-life = 3-5 min
  – Duration of effect >10 min
• Cost = up to $2000/vial

Secretin Basics

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*Note: Secretin is typically used for diagnostic imaging purposes in the pancreas, particularly to aid in the visualization of pancreatic duct structures and to assess for possible pancreatic abnormalities or obstructions. Its use may be particularly beneficial in cases of pancreas divisum or other conditions that may affect the normal flow of digestive juices. However, its primary role is not as a routine imaging agent but rather as a tool to enhance the diagnostic process when specific conditions are present.
Adjuncts to secretin

- Negative enteric contrast
  - Forms
    - Superparamagnetic iron oxide (ferumoxsil)
    - Juice – pineapple, blueberry, acai
      - Not all created equal
  - May help duct visibility / image quality
  - ? Confounding for exocrine function assessment?
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“In this study, we made the assumption that once the pancreatic fluid reached the duodenum its signal was not dramatically suppressed by the negative oral contrast agent.” – Matos. 1997

Basic Imaging Sequences

• Duct assessment
  – 3D MRCP
    • Resp triggered, BH, Navigator
  – Thick slab MRCP
    • Angled to duct

• Exocrine function
  – BH fat sat T2 (SSFSE)
Pure Pediatric Data

• All related to duct assessment
  • Arcement et al. Ped Rad. 2001 (n = 3)
    – Subjective improvement in duct visibility
  • Manfredi et al. Radiology. 2002 (n = 16)
    – Improved sensitivity for findings of chronic pancreatitis (but more false pos)
    – Duct dilation ~1 mm
  • Delaney et al. Ped Rad. 2008 (n = 41)
    – Subjective improvement in duct visibility
    – Duct dilation ~0.5 mm
  • Trout et al. Ped Rad. 2013 (n = 20)
    – No improvement in duct visibility
    – Duct dilation ~0.3 mm
Duct visibility

• Secretin *likely* improves visibility of the duct
  – May add value in detecting occult anatomic abnormalities
  – Caveats:
    • Most published data confounded (non-blinded)
    • Diseased ducts are generally visible w/o secretin
Assessment of Exocrine Function

- Qualitative
- Quantitative
Assessment of Exocrine Fxn

• Qualitative
  – Dynamic thick slab imaging or serial static images
  – Matos grading
    • Grade 0 – no secretion
    • Grade 1 – filling of bulb
    • Grade 2 – filling to genu inferius
    • Grade 3 – filling beyond genu inferius

modified from: emedicine.com
Assessment of Exocrine Function

• Qualitative
  – Matos not validated in children
Assessment of Exocrine Function

- sMRCP graded per Matos correlates with lab-based diagnosis of exocrine insuff (fecal elastase, fecal fat, breath test)
  - 69% sens, 90% spec
- sMRCP graded per Matos correlates with bicarbonate secretion by endoscopic PFTs

Assessment of Exocrine Function

• Qualitative

• Quantitative
  – Total secreted fluid volume
    • Dual time-point imaging
  – Flow rate (mL / min)
    • Multi-time-point imaging
Assessment of Exocrine Function

- Image segmentation
  - Pre- and post-secretin imaging parameters should be identical
- Fluid pixels
  - Threshold
  - Water standard
- Fluid area per slice
- $\Sigma(\text{area} \times \text{slice thickness})$
Assessment of Exocrine Function

- Normative data exist for adults
  - $111.8 \pm 49.8$ mL at $11.9 \pm 2.8$ minutes
- No normative data for pediatrics
  - We are working on this
Sneak Peak

n = 29
Ages 6 - 16

Secreted Volume (mL)

Adult mean
Mean – 1SD
Mean – 2SD

Unpublished data
Conclusions

- Secretin can add value in the assessment of pancreatic disease by MRI
- Current roles include:
  - Improved duct visualization (likely)
  - Exocrine function assessment
- Qualitative vs. Quantitative
THANK YOU